

Sum & Product Practice

Task 1: The Hardest Part...

In each diagram below, write the two numbers on the sides of the "X" that are *multiplied* together to get the top number of the "X," but *added* together to get the bottom number of the "X."

1. $\begin{array}{c} 9 \\ -3 \quad -3 \\ -6 \end{array}$	2. $\begin{array}{c} 4 \\ 2 \quad 2 \\ 4 \end{array}$	3. $\begin{array}{c} -30 \\ +2 \quad -15 \\ -13 \end{array}$	10. $\begin{array}{c} -6 \\ +2 \quad -3 \\ -1 \end{array}$	11. $\begin{array}{c} -12 \\ 1 \quad -12 \\ -11 \end{array}$	12. $\begin{array}{c} 7 \\ +1 \quad +7 \\ 8 \end{array}$
4. $\begin{array}{c} -84 \\ -7 \quad 12 \\ 5 \end{array}$	5. $\begin{array}{c} -24 \\ 3 \quad -8 \\ -5 \end{array}$	6. $\begin{array}{c} 6 \\ -2 \quad -3 \\ -5 \end{array}$	13. $\begin{array}{c} -8 \\ -1 \quad 8 \\ 7 \end{array}$	14. $\begin{array}{c} 12 \\ -3 \quad -4 \\ -7 \end{array}$	15. $\begin{array}{c} 20 \\ -4 \quad -5 \\ -9 \end{array}$
7. $\begin{array}{c} -15 \\ 1 \quad -15 \\ -14 \end{array}$	8. $\begin{array}{c} -75 \\ 5 \quad -15 \\ -10 \end{array}$	9. $\begin{array}{c} 12 \\ +3 \quad +4 \\ 7 \end{array}$	16. $\begin{array}{c} 16 \\ -4 \quad -4 \\ -8 \end{array}$	17. $\begin{array}{c} 2 \\ -1 \quad -2 \\ -3 \end{array}$	18. $\begin{array}{c} 18 \\ -3 \quad -6 \\ -9 \end{array}$
19. $\begin{array}{c} -36 \\ -2 \quad 18 \\ 16 \end{array}$	20. $\begin{array}{c} 1 \\ -1 \quad -1 \\ -2 \end{array}$	21. $\begin{array}{c} 24 \\ -2 \quad -12 \\ -14 \end{array}$	22. $\begin{array}{c} -12 \\ 2 \quad -6 \\ -4 \end{array}$	23. $\begin{array}{c} -72 \\ 3 \quad -24 \\ -21 \end{array}$	24. $\begin{array}{c} -1 \\ 1 \quad -1 \\ 0 \end{array}$
	25. $\begin{array}{c} 13 \\ -1 \quad -13 \\ -14 \end{array}$	26. $\begin{array}{c} -34 \\ -2 \quad 17 \\ 15 \end{array}$	27. $\begin{array}{c} 9 \\ 3 \quad 3 \\ 6 \end{array}$		

84 | 2
42 | 2
21 | 3
7 | 7
1

$\begin{array}{r} 70 \\ 35 \\ 21 \\ 7 \end{array}$

28. $\begin{array}{c} -48 \\ 3 \quad -16 \\ -13 \end{array}$	29. $\begin{array}{c} -36 \\ 6 \quad -6 \\ 0 \end{array}$	30. $\begin{array}{c} -70 \\ -5 \quad 14 \\ 9 \end{array}$	37. $\begin{array}{c} 16 \\ -4 \quad -4 \\ -8 \end{array}$	38. $\begin{array}{c} -36 \\ -2 \quad 18 \\ -16 \end{array}$	39. $\begin{array}{c} -25 \\ -5 \quad 5 \\ 0 \end{array}$
31. $\begin{array}{c} -44 \\ 2 \quad -22 \\ -20 \end{array}$	32. $\begin{array}{c} -42 \\ 6 \quad -7 \\ -1 \end{array}$	33. $\begin{array}{c} -72 \\ -8 \quad 9 \\ 1 \end{array}$	40. $\begin{array}{c} 51 \\ +3 \quad +17 \\ 20 \end{array}$	41. $\begin{array}{c} -6 \\ -1 \quad 6 \\ 5 \end{array}$	42. $\begin{array}{c} 49 \\ +7 \quad +7 \\ 14 \end{array}$
34. $\begin{array}{c} 24 \\ 1 \quad 24 \\ 25 \end{array}$	35. $\begin{array}{c} 28 \\ 4 \quad 7 \\ 11 \end{array}$	36. $\begin{array}{c} 34 \\ 2 \quad 17 \\ 19 \end{array}$	43. $\begin{array}{c} -21 \\ 3 \quad -7 \\ -4 \end{array}$	44. $\begin{array}{c} 25 \\ 5 \quad 5 \\ 10 \end{array}$	45. $\begin{array}{c} 48 \\ -4 \quad -12 \\ -16 \end{array}$

Task 2: Factor Each Simple Trinomial

- | | | |
|-------------------------------------|---|---------------------------------------|
| 1. $x^2 + 3x - 10$
$(x-2)(x+5)$ | $\begin{array}{c} M \\ 10 \\ 3 \\ 2 \\ 5 \end{array}$ | 2. $x^2 + 5x + 6$
$(x+2)(x+3)$ |
| 3. $x^2 - x - 6$
$(x+2)(x-3)$ | $\begin{array}{c} 6 \\ 2 \\ -3 \\ 4 \end{array}$ | 4. $x^2 - 2x - 63$
$(x+7)(x-9)$ |
| 5. $x^2 + 5x - 6$
$(x-1)(x+6)$ | | 6. $x^2 + 7x + 6$
$(x+1)(x+6)$ |
| 7. $x^2 + 3x - 40$
$(x-5)(x+8)$ | | 8. $x^2 - x - 56$
$(x+7)(x-8)$ |
| 9. $x^2 - 15x + 54$
$(x-6)(x-9)$ | | 10. $x^2 - 14x + 24$
$(x-2)(x-12)$ |
| 11. $x^2 - 5x + 6$
$(x-2)(x-3)$ | | 12. $x^2 - 6x - 16$
$(x+2)(x-8)$ |
| 13. $x^2 - 7x + 6$
$(x-1)(x-6)$ | | 14. $x^2 - x - 2$
$(x+1)(x-2)$ |
| 15. $x^2 - 5x - 14$
$(x+2)(x-7)$ | | 16. $x^2 - 12x + 20$
$(x-2)(x-10)$ |
| 17. $x^2 - 10x + 9$
$(x-1)(x-9)$ | | 18. $x^2 + x - 6$
$(x-2)(x+3)$ |
| 19. $x^2 + x - 12$
$(x-3)(x+4)$ | | 20. $x^2 - 5x - 6$
$(x+1)(x-6)$ |

Answers

- (not in order)
- $(x+1)(x-6)$
 - $(x+4)(x-3)$
 - $(x-3)(x+2)$
 - $(x-1)(x-6)$
 - $(x-1)(x+6)$
 - $(x-7)(x+2)$
 - $(x+2)(x+3)$
 - $(x-8)(x+7)$
 - $(x-9)(x+7)$
 - $(x-5)(x+8)$
 - $(x+3)(x-2)$
 - $(x-10)(x-2)$
 - $(x-2)(x+5)$
 - $(x-3)(x-2)$
 - $(x+1)(x+6)$
 - $(x-8)(x+2)$
 - $(x-9)(x-6)$
 - $(x-12)(x-2)$
 - $(x-1)(x-9)$
 - $(x+1)(x-2)$

Task 3: Factor Each Tricky Trinomial

21. $2x^2 + 9x - 5$ $-10/9/-1, 10$
 $2x^2 - x + 10x - 5$
 $x(2x-1) + 5(2x-1) \Rightarrow (x+5)(2x-1)$

23. $9x^2 + 3x - 2$ $-18/3/-3, 6$
 $= 9x^2 - 3x + 6x - 2$
 $= 3x(3x-1) + 2(3x-1) \Rightarrow (3x-1)(3x+2)$

25. $3x^2 + 2x - 21$ $-63/2/-7, 9$
 $= 3x^2 - 7x + 9x - 21$
 $= x(3x-7) + 3(3x-7) \Rightarrow (x+3)(3x-7)$

27. $2x^2 + 9x + 7$ $14/9/2, 7$
 $= 2x^2 + 2x + 7x + 7$
 $= 2x(x+1) + 7(x+1) \Rightarrow (x+1)(2x+7)$

29. $2x^2 - 5x + 3$ $6/-5/-2, -3$
 $2x^2 - 2x - 3x + 3$
 $2x(x-1) - 3(x-1) \Rightarrow (x-1)(2x-3)$

31. $4x^2 + 8x + 3$ $12/8/2, 6$
 $= 4x^2 + 2x + 6x + 3$
 $= 2x(2x+1) + 3(2x+1) \Rightarrow (2x+1)(2x+3)$

33. $6x^2 - 11x + 5$ $30/-11/-6, 5$
 $= 6x^2 - 6x - 5x + 5$
 $= 6x(x-1) - 5(x-1) \Rightarrow (x-1)(6x-5)$

35. $3x^2 + 16x + 5$ $15/16/1, 15$
 $3x^2 + x + 15x + 5$
 $= x(3x+1) + 5(3x+1) \Rightarrow (x+5)(3x+1)$

37. $4x^2 + 5x + 1$ $4/5/1, 4$
 $= 4x^2 + x + 4x + 1$
 $= x(4x+1) + 1(4x+1) \Rightarrow (x+1)(4x+1)$

39. $5x^2 + 16x + 3$ $15/16/1, 15$
 $= 5x^2 + x + 15x + 3$
 $= x(5x+1) + 3(5x+1) \Rightarrow (x+3)(5x+1)$

22. $4x^2 - 17x + 15$ $60/-17/-5, 12$
 $= 4x^2 - 5x - 12x + 15$
 $= x(4x-5) - 3(4x-5) \Rightarrow (4x-5)(x-3)$

24. $10x^2 - 11x - 6$ $-60/-11/4, -15$
 $= 10x^2 - 15x + 4x - 6$
 $= 5x(2x-3) + 2(2x-3) \Rightarrow (2x-3)(5x+2)$

26. $3x^2 + 8x + 5$ $15/8/3, 5$
 $3x^2 + 3x + 5x + 5$
 $3x(x+1) + 5(x+1) \Rightarrow (x+1)(3x+5)$

28. $9x^2 - 9x - 4$ $-36/-9/3, -12$
 $9x^2 - 12x + 3x - 4$
 $3x(3x-4) + (3x-4) = (3x-4)(3x+1)$

30. $5x^2 + 8x + 3$ $15/8/3, 5$
 $= 5x^2 + 3x + 5x + 3$
 $= x(5x+3) + (5x+3) \Rightarrow (x+1)(5x+3)$

32. $5x^2 + 38x + 21$ $105/38/3, 35$
 $5x^2 + 3x + 35x + 21$
 $x(5x+3) + 7(5x+3) \Rightarrow (x+7)(5x+3)$

34. $4x^2 - x - 14$ $-56/-1/7, -8$
 $= 4x^2 + 7x - 8x - 14$
 $= x(4x+7) - 2(4x+7) = (4x+7)(x-2)$

36. $5x^2 - 3x - 14$ $-70/-3/7, -10$
 $= 5x^2 - 10x + 7x - 14$
 $= 5x(x-2) + 7(x-2) \Rightarrow (x-2)(5x+7)$

38. $2x^2 + 15x + 7$ $14/15/1, 14$
 $= 2x^2 + x + 14x + 7$
 $= x(2x+1) + 7(2x+1) \Rightarrow (2x+1)(x+7)$

40. $15x^2 - 28x + 5$ $75/-28/-3, 25$
 $15x^2 - 3x - 25x + 5$
 $= 3x(5x-1) - 5(5x-1)$
 $= (5x-1)(3x-5)$

- Answers**
(not in order)
- (x + 7)(5x + 3)
 - (2x - 3)(5x + 2)
 - (3x + 5)(x + 1)
 - (x - 3)(4x - 5)
 - (5x + 1)(x + 3)
 - (3x + 2)(3x - 1)
 - (2x - 1)(x + 5)
 - (3x + 1)(x + 5)
 - (4x + 1)(x + 1)
 - (5x + 7)(x - 2)
 - (3x - 5)(5x - 1)
 - (3x + 1)(3x - 4)
 - (2x + 7)(x + 1)
 - (4x + 7)(x - 2)
 - (2x - 3)(x - 1)
 - (6x - 5)(x - 1)
 - (5x + 3)(x + 1)
 - (3x - 7)(x + 3)
 - (2x + 1)(x + 7)
 - (2x + 1)(2x + 3)

Task 4: Factor Fully (Remove Common Factors First)

41. $4x^2 - 4x - 24$ $4(x^2 - x - 6)$
 $= 4(x+2)(x-3)$

43. $12x^{10} + 42x^9 + 18x^8$ $6x^8(2x^2 + 7x + 3)$
 $6x^8(2x^2 + x + 6x + 3)$
 $6x^8[x(2x+1) + 3(2x+1)] \Rightarrow 6x^8(x+3)(2x+1)$

45. $x^4 + x^3 - 6x^2$
 $x^2(x^2 + x - 6) = x^2(x-2)(x+3)$

47. $-x^2 + x + 6 = -(x^2 - x - 6)$
 $= -(x+2)(x-3)$

49. $x^3 + 6x^2 + 5x$
 $= x(x^2 + 6x + 5)$
 $= x(x+1)(x+5)$

42. $2x^3 - 14x^2 - 36x$ $2x(x^2 - 7x - 18)$
 $| 2x(x+2)(x-9)$

44. $-x^2 - 2x + 3$
 $| -(x^2 + 2x - 3)$
 $= -(x-1)(x+3)$

46. $-8x^2 - 20x + 12$ $-4(2x^2 + 5x - 3)$
 $= -4(2x^2 - x + 6x - 3)$
 $= -4(x(2x-1) + 3(2x-1)) \Rightarrow -4(x+3)(2x-1)$

48. $x^5 + 4x^4 + 3x^3$
 $= x^3(x^2 + 4x + 3)$
 $= x^3(x+1)(x+3)$

50. $6x^2 + 2x - 20$
 $= 2(3x^2 + x - 10)$ $-30/1/-5, 6$
 $= 2(3x^2 - 5x + 6x - 10)$
 $= 2[x(3x-5) + 2(3x-5)] \Rightarrow 2(x+2)(3x-5)$

- Answers**
(not in order)
- 4(2x - 1)(x + 3)
 - 2(3x - 5)(x + 2)
 - x³(x + 1)(x + 3)
 - (x + 3)(x - 1)
 - 4(x + 2)(x - 3)
 - (x + 2)(x - 3)
 - x(x + 5)(x + 1)
 - 6x⁸(2x + 1)(x + 3)
 - x²(x + 3)(x - 2)
 - 2x(x + 2)(x - 9)